

Amendments to the Claims

Claim 1 (Currently amended): An isolated and purified beta-expansin protein comprising the following ~~characteristics~~ characteristics:

- a) a His Phe Asp Leu Ser Gly motif,
- b) is found in plant cell walls, and
- c) having one or more functional characteristics of beta-expansins such as inducing expansion or stress ~~relation on grass cell~~ relaxation of monocot cell walls more effectively ~~on monocot cell walls than on dicotyledon cell walls as determined by~~ using cell wall extension and/or stress relation-relaxation assays.

Claim 2 (Currently amended): An isolated and purified beta-expansin protein comprising the following ~~characteristics~~ characteristics:

- a) a Thr Trp Tyr Gly motif,
- b) is found in plant cell walls, and
- c) having one or more functional characteristics of beta-expansins such as inducing expansion or stress ~~relation on grass cell~~ relaxation of monocot cell walls more effectively on monocot cell walls than on dicotyledon cell walls as determined by using cell wall extension and/or stress relation-relaxation assays.

Claim 3 (Currently amended): An isolated and purified beta-expansin protein comprising the following ~~characteristics~~ characteristics:

- a) a Gly Gly Ala Cys Gly motif.

- b) is found in plant cell walls, and
- c) having one or more functional characteristics of beta-expansins such as inducing expansion or stress ~~relation-on-grass-cell-relaxation of monocot cell~~ walls more effectively on monocot cell walls than on dicotyledon cell walls as determined by using cell wall extension and/or stress relation-relaxation assays.

Claim 4 (Currently amended): An isolated and purified beta-expansin protein comprising the following ~~characteristics~~ characteristics:

- a) a His Phe Asp motif,
- b) is found in plant cell walls, and
- c) having one or more functional characteristics of beta-expansins such as inducing expansion or stress ~~relation-on-grass-cell-relaxation of monocot cell~~ walls more effectively on monocot cell walls than on dicotyledon cell walls as determined ~~by using~~ cell wall extension and/or stress ~~relation-relaxation~~ assays.

Claim 5 (Currently amended): An isolated and purified protein, characterized by the following:

- a) a beta-expansin protein a group I grass pollen allergen structurally and functionally related to an alpha expansin protein in Figure 6;
- b) inducing extension of a plant cell wall;
- c) inducing stress relaxation of a plant cell wall;

- d) a 25% or less sequence similarity ~~with by BLAST or FASTA algorithms to an alpha-expansin sequences as shown in Figure 6;~~ and
- e) a His Phe Asp Leu Ser Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins).

Claim 6 (Currently amended): The protein, ~~or fragment thereof,~~ of claim 5 wherein said protein is a member of the beta-expansin family.

Claim 7 (Currently amended): The protein, ~~or fragment thereof,~~ of claim 5, further comprising an amino acid alignment of a Thr Trp Tyr Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins) and wherein said beta-expansin induces extension or stress relaxation of a plant cell wall material.

Claim 8 (Currently amended): The protein, ~~or fragment thereof,~~ of claim 5, further comprising an amino acid alignment of a Gly Gly Ala Cys Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins) and wherein said beta-expansin induces extension or stress relaxation of a plant cell wall material.

Claim 9 (Currently amended): The protein, ~~or fragment thereof,~~ of claim 5, further comprising an amino acid alignment of a His Phe Asp motif based on the conserved amino acid

sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins) and wherein said beta-expansin induces extension or stress relaxation of a plant cell wall material.

Claim 10 (Currently amended): The protein, ~~or fragment thereof~~, of claim 5, further comprising an amino acid sequence selected from the group consisting of SEQ ID NO:10, ~~SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14 and SEQ ID NO:15.~~

Claim 11 (Currently amended): The protein[[,]] of claim 5, wherein said beta-expansin protein is isolated and purified from a monocotyledonous species.

Claim 12 (Currently amended): The protein[[,]] of claim 5, wherein said beta-expansin protein is recombinantly produced from a monocotyledonous species.

Claim 13 (Currently amended): The protein[[,]] of claim 5, wherein said beta-expansin protein is selected from the group ~~comprising~~ consisting of: a vegetative homolog of a group I grass pollen allergen ~~or and a grass group I pollen allergen~~ an isolated polynucleotide encoding said beta-expansin.

Claim 14 (Currently amended): The protein[[,]] of claim 5, wherein said beta-expansin protein is isolated and purified or recombinantly produced from a ~~dicotyledonous~~ monocotyledonous species.

Claim 15 (Currently amended): An isolated and purified protein, or fragment thereof, characterized by the following:

- a) ~~a beta expansin protein a group I grass pollen allergen~~ structurally and functionally related to an alpha expansin protein in Figure 6;
- b) inducing extension of a plant cell wall;
- c) inducing stress relaxation of a plant cell wall;
- d) a 25% or less sequence similarity ~~with by BLAST or FASTA algorithms~~ to an alpha-expansin sequences as shown in Figure 6; and
- e) a Gly Gly Ala Cys Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins).

Claim 16 (Original): The protein, or fragment thereof, of claim 15, wherein said protein is a member of the beta-expansin family.

Claim 17 (Original): The protein, or fragment thereof, of claim 15, further comprising an amino acid alignment of a Thr Trp Tyr Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins) and wherein said beta-expansin induces extension or stress relaxation of a plant cell wall material.

Claim 18 (Original): The protein, or fragment thereof, of claim 15, further comprising an amino acid alignment of a His Phe Asp motif based on the conserved amino acid sequences of the seven

beta-expansin proteins shown in Figure 5 as determined by BLAST or FASTA algorithms (when compared to alpha-expansins) and wherein said beta-expansin induces extension or stress relaxation of a plant cell wall material.

Claim 19 (Currently amended): The protein, or fragment thereof, of claim 15, further comprising an amino acid sequence selected from the group consisting of SEQ ID NO:10, ~~SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14 and SEQ ID NO:15.~~

Claim 20 (Original): The protein, of claim 15, wherein said beta-expansin protein is isolated and purified from a monocotyledonous species.

Claim 21 (Original): The protein, of claim 15, wherein said beta-expansin protein is recombinantly produced from a monocotyledonous species.

Claim 22 (Currently amended): The protein, of claim 15, wherein said beta-expansin protein is selected from the group ~~comprising~~ consisting of: a vegetative homolog of a group I grass pollen allergen ~~or and a grass group I pollen allergen~~ an isolated polynucleotide encoding said beta-expansin.

Claim 23 (Currently amended): The protein[[,]] of claim 15[[,]] wherein said beta-expansin protein is isolated and purified or recombinantly produced from a dicotyledonous species.

Claim 24 (Currently amended): [[A]]An isolated protein comprising one or more functional characteristics of a beta-expansin ~~such as comprising~~ inducing extension or stress relaxation of a plant cell wall material, is more effective on monocotyledonous plant cell walls than on dicotyledonous plant cell walls, is determined using cell wall extension and stress relaxation assays, and which has a His Phe Asp Leu Ser Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5, when said sequence is aligned with an amino acid sequence selected from selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14 and SEQ ID NO:15 as determined by Clustal alignment algorithm.

Claim 25 (Currently amended): [[A]]An isolated protein, said protein comprising one or more functional characteristics of a beta-expansin ~~such as comprising~~ inducing extension or stress relaxation of a plant cell wall material, is more effective on monocotyledonous plant cell walls than on dicotyledonous plant cell walls, is determined using cell wall extension and stress relaxation assays, and has a Gly Gly Ala Cys Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5, when said sequence is aligned with an amino acid sequence selected from selected from the group consisting of SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14 and SEQ ID NO:15 as determined by Clustal alignment algorithm.

Claim 26 (Original): A purified and isolated beta-expansin protein, said beta-expansin protein being present in grass pollen and comprises a His Phe Asp Leu Ser Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 and

wherein said protein having a property of inducing extension or stress relaxation of a plant cell wall material.

Claim 27 (Original): The purified and isolated beta-expansin protein, of claim 26, the beta-expansin protein further comprising: a Gly Gly Ala Cys Gly motif or a Thr Trp Tyr Gly motif or a His Phe Asp motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5 of said beta-expansin protein and wherein said protein having a property of inducing extension or stress relaxation of a plant cell wall material.

Claim 28 (Currently amended): ~~The A~~ purified and isolated beta-expansin protein, ~~or fragment thereof of claim 26,~~ said beta-expansin protein comprises a His Phe Asp Leu Ser Gly motif based on the conserved amino acid sequences of the seven beta-expansin proteins shown in Figure 5, ~~said fragment protein~~ having a property of inducing extension or stress relaxation of a plant cell wall material, wherein said beta-expansin is a vegetative homolog of a group I grass pollen allergen or group I grass pollen allergen encoded by an isolated polynucleotide encoding said beta-expansin and is not of soybean origin.

Claim 29 (Withdrawn): The polynucleotide of claim 28 having a molecular weight from about 24 kDa to about 35 kDa.

Claim 30 (Withdrawn): The protein, or fragment thereof, of claim 26, said beta-expansin being of a dicotyledonous origin, said fragment having a property of inducing extension or stress relaxation of a plant cell wall material, wherein said beta-expansin is not of soybean origin.

Claim 31 (Withdrawn): A method for cloning a polynucleotide encoding a beta-expansin comprising the steps of:

- a) preparing a genomic or a cDNA library from an organism of interest, and
- b) using a conserved expansin polynucleotide (i) as a probe to screen said library or (ii) as a primer to amplify polynucleotide fragments from said library.

Claim 32 (Withdrawn): The method of claim 31, wherein said polynucleotide has the functional characteristics of altering physical properties of a plant cell wall material comprising the step of contacting said material with said polynucleotide encoding a beta-expansin.

Claim 33 (Withdrawn): A method for detecting and identifying a beta-expansin protein, comprising the steps of:

- a) isolating a vegetative homolog of the group I grass pollen allergens;
- b) inferring a phylogenetic relationship of said beta-expansin protein to the phylogenetic tree of Figure 4, said tree having been prepared from the reference sequences shown in Figure 5, with the use of sequence analysis software; and
- c) locating the placement of said sequence with respect to the initial branch point, as shown in Figure 4;
- d) characterizing said beta-expansin by the functional characteristics of inducing extension or stress relaxation of a plant cell wall material,

- e) determining the sequence to be said beta-expansin by falling within the branch point comprising group I grass pollen allergens and homologs as opposed to an alpha-expansins.

Claim 34 (Withdrawn): The method of claim 33 wherein said tree is constructed by aligning protein sequences using the Clustal program with PAM250 analysis weight table and bootstrap analysis using nearest neighboring joining of Poisson-corrected values.

Claim 35 (Currently amended): A composition comprising:

- a) an amino acid sequence comprising a beta-expansion, said sequence being identifiable by isolating a vegetative homolog of the group I grass pollen allergens, wherein said beta-expansin comprises 25% or less sequence similarity with by BLAST or FASTA algorithms to an alpha-expansin sequence shown in Figure 6;
- b) inferring a phylogenetic relationship of said beta-expansin protein to the phylogenetic tree of Figure 4, said tree having been prepared from the reference sequences shown in Figure 5, with the use of sequence analysis software; and
- c) locating the placement of said sequence with respect to the initial branch point, as shown in Figure 4;
- d) characterizing said beta-expansin by the functional characteristics of inducing extension or stress relaxation of a plant cell wall material,
- e) determining the sequence to be said beta-expansin by falling within the branch point comprising group I grass pollen allergens and homologs as opposed to an alpha-expansins.

Claim 36 (Currently amended): The composition of claim 35 ~~wherein said functional characteristic of a plant cell wall is selected from the group consisting of: comprising further characterizing said beta-expansin by determining the~~ loosening or expanding cell walls, altering cell wall mechanical strength, altering the bonding relationship between the components of the cell wall and altering the growth of the plant cell wall.

Claim 37 (Canceled).

Claim 38 (Original): The amino acid sequence protein as in claim 35 having a property of inducing extension or stress relaxation of a plant cell wall material, said protein having an amino acid sequence with conserved amino acids as shown in Figure 5, when said sequence is aligned with the conserved regions from the group comprising: a Thr Trp Tyr Gly motif and a Gly Gly Ala Cys Gly motif and a His Phe Asp Leu Ser Gly motif and a His Phe Asp motif using BLAST or FASTA algorithms (when compared to alpha-expansins).

Claim 39 (Currently amended): A composition comprising a beta-expansin, said composition having a property of inducing extension or stress relaxation of a plant cell wall material wherein said beta-expansin comprises 25% or less sequence similarity by BLAST or FASTA algorithms to alpha-expansin sequences as shown in Figure 5, said beta-expansin further having one or more functional characteristics of said beta-expansin ~~such as comprising~~ inducing extension or stress relaxation on monocotyledonous cell walls more effectively than on dicotyledonous cell walls as determined by cell wall extension and stress relaxation assays.

Claim 40 (Currently amended): The composition of claim 39, wherein said beta-expansin comprises an amino acid sequence selected from the group consisting of SEQ ID NO:10, ~~SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14 and SEQ ID NO:15.~~